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PATENT & TRADEMARK OFFICE

SP03-072

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	John H. Brennan, et al.	
Serial No:	10/606,509	Examiner: V. Lyles Irving
Filed:	06/26/2003	Group Art Unit: 1731
Title:	Method for Fabricating Ceramic Articles Containing Organic Components	

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Sir:

Transmitted herewith is one (1) copy of an Appeal Brief (7 pages with 4 page Appendix) in the above-identified application.

Authorization is given by Corning Incorporated to charge the appropriate fee and any additional fees necessary due in connection with this filing to Deposit Account No. 03-3325.

Respectfully submitted,

Dated: February 1, 2006

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CERTIFICATE OF MAILING (37 CFR 1.8a)
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Randall S. Wayland

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PATENT
Attorney Docket No.: SP03-072

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BRIEF ON APPEAL

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated June 01, 2005, in the application listed above. Appellant filed the Notice of Appeal on November 01, 2005. Appellant now submits this Brief as required by 37 C.F.R. § 1.192(a).

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated, assignee of the entire interest in this application by virtue of an assignment recorded 06/26/2003 at Reel/ Frame 014240/0316.

II. RELATED APPEALS AND INTERFERENCES

With respect to prior or pending appeals, interferences or judicial proceedings, there are no such appeals, interferences or judicial proceedings known to Appellant, Appellant's legal representative or Appellant's assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

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III. STATUS OF CLAIMS

Claims 1 – 2, 4 – 6, 8-11, 15-20 and 22 – 27 were finally rejected in an Office Action dated June 1, 2005. Claims 1 – 2, 4 – 6, 8-11, 15-20 and 22 – 27 are the pending claims that are the subject of this Appeal and are set forth in the attached Appendix. Claims 3, 7, 12 – 14 and 15-20 have been canceled as a result of a previous amendment.

IV. STATUS OF AMENDMENTS

There has been an amendment filed on 8/01/05 subsequent to final rejection, requesting amendment to claim 2. This amendment to claim 2 has been entered, as indicated in the Advisory Action dated 8/29/05.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 relates to a method of fabricating a fired ceramic article. In particular, the article is formed by forming a batch mixture of ceramic powder materials and inorganic compounds (page 4, para. [0019]). The organic compounds have weight loss onset temperatures of varying values (page 5, para. [0019]). The organic compounds include a first organic compound with a first weight loss onset temperature of a lower value and a second organic compound with a higher weight loss onset temperature (Page 6, para. [0026]; page 7, para. [0026]). The batch components are intimately blended to form a plasticized mixture (page 5, para. [0021] and [0022]). Thereafter, the mixture is shaped into a green ceramic structural body (page 5, para. [0023]) and dried (page 6, para. [0025]). Following drying, the body is subjected to heating in a first phase, the heating being done in an oxidizing atmosphere to a temperature and for a time to enable sequential removal of the organic compounds (page 6, para. [0026]). In particular, the organic compound with the first weight loss onset temperature of lowest value is substantially removed prior to the organic compound with the subsequent higher weight loss onset temperature (page 6, para. [0026]; page 7, para. [0030]). This method not only reduces or eliminates cracking in thin-walled articles, but also promotes safe levels of VOCs in the kiln atmosphere, thereby eliminating explosions. Following the first heating phase, the green ceramic structural body is heated in a second phase to a temperature and for a time to achieve the conversion of the green ceramic structural body into a fired ceramic article (page 8, para. 0032]).

Claim 16 relates to a method of firing a green ceramic structural body including an oil or oil-based compound, a binder and optionally other organic components, the method comprising drying the green ceramic structural body and following drying, firing the green ceramic structural body in an atmosphere containing up to 21% by volume O_2 (page 6, para. [0026]) to a temperature and for a time to *substantially remove (emphasis added)* the oil or oil-based compound *prior to release (emphasis added)* of the binder and other optional organic components (page 6, para. [0026] and Fig. 2). The green ceramic structural body is then further fired to a temperature and for a time to achieve the conversion of the green ceramic structural body into a fired ceramic article.

Claim 24 relates to a method of fabricating a ceramic article. The method comprises the steps of forming a batch mixture of components comprising inorganic ceramic powder materials, an oil or an oil-based organic compound having a first weight loss onset temperature, and an organic binder compound having a second weight loss onset temperature higher than the first weight loss onset temperature (page 4, para. [0019]). The batch components are then blended to form a plasticized mixture and shaped into a green ceramic structural body (page 5, para. [0023]). The green ceramic structural body is dried, and following drying and during firing, green ceramic structural body is heated to a first temperature at or above the first weight loss onset temperature, but below the second weight loss onset temperature for a time to enable *substantial removal (emphasis added)* of the oil or an oil-based organic compound, and then followed by further heating at a temperature at or above the second weight loss onset temperature until there is *substantial removal* of the organic binder compound (page 6, para. [0026]; page 7, para. [0028] and [0029]). The green ceramic structural body is then further heated to a temperature and for a time to achieve the conversion of the green ceramic structural body into a fired ceramic article.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1 – 2, 4 – 6, 8-11, 15-20 and 22 – 27 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over **Beall (US 6,132,671)** in view of **Chalsani et al. (US 6,080,345)** and **Gheorgiu (US 6,287,671).**

VII. ARGUMENT

The rejection of claims 1 – 2, 4 – 6, 8-11, 15-20 and 22 – 27 under 35 U.S.C. § 103(a) as being unpatentable over Beall (US 6,132,671) in view of Chalsani et al. (US 6,080,345) and Gheorgiu (US 6,287,671) is improper.

Applicants respectfully request reversal of the Examiner's rejection of claims 1 – 2, 4 – 6, 8-11, 15-20 and 22 – 27 under 35 U.S.C. § 103(a) as being unpatentable. Applicants assert that all dependent claims stand or fall with the independent claims from which they depend.

A proper *prima facie* showing of obviousness requires the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, to contain some suggestion which would have motivated the skilled artisan to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Additionally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

With regard to claim 1, the rejection is deficient as to these points. Simply, none of the references, alone or in combination, teach or suggest the claimed invention, i.e., the organic compound with the lower weight loss onset temperature being ***substantially removed*** prior to the organic compound with the higher weight loss onset temperature and where an *oxidizing atmosphere* is provided.

Respectfully, we believe that Examiner is also misreading Beall. Examiner states that Beall teaches that *if only a portion of the binder is removed* during drying that the rest must be removed in a first phase of firing. However, even if that were true, Beall does not teach the claimed invention. In the present invention, the organic compound with the lower weight loss onset temperature is *substantially removed* prior to the release of the organic compound with the higher onset temperature while also providing an oxidizing environment. As such, the present invention through the use of substantial removal of the first prior to removal of the second, allows firing with substantially reduced cracking and without explosions.

Further, since Beall teaches removal of the first organic compound during drying, it does not teach or suggest how any further problems, i.e., cracking and/or explosive firing environments, may be overcome. Likewise, although Chalasani teaches a similar binder system, there is no indication of how to overcome problems encountered in firing it. In particular, neither Beall nor Chalasani teach or suggest what special handling considerations

might be employed in the firing step to achieve *substantial removal* of the first prior to the release of the second. Unless the firing conditions are controlled appropriately, substantial removal will not necessarily be obtained. Accordingly, the limitation of *substantial removal* is lacking in the prior art.

In particular, none of the cited references, alone or in combination, teach in a first phase, following drying, heating in an *oxidizing atmosphere* to a temperature and for a time to enable sequential removal of the organic compounds, such that the organic compound with the lower weight loss onset temperature is *substantially removed* prior to the release of the organic compound with the higher weight loss onset temperature. Examiner offers no rationale whatsoever why Beall or Chalasani teaches *substantial removal* of the first organic compound prior to the release of the second organic compound with the higher weight loss onset temperature. Examiner's position is that "any amount" of removal constitutes substantial removal. This simply does not comport with the common meaning of the term.

S*ubstantial removal* is a requirement and limitation of the claims. Examiner should pay close attention to Fig. 2 in the present application. Fig. 2 illustrates that to achieve *substantial removal* prior to the second organic, firing considerations must be employed such as holding the furnace temperature below the weight loss onset temperature of the second organic for a time until the first is *substantially removed* (See para. 0028). Thus, special considerations must be employed to achieve *substantial removal.*

The present invention addresses the problems of propensity for part cracking and/or providing a safer environment by substantial removal of the first organic compound prior to the second in an oxidizing firing environment. Further, since none of the references cited are: 1) directed to the same problem, or 2) teach any solution to it, they cannot render the claimed invention obvious. They do not teach or suggest *substantial removal.*

Examiner does not even address the teachings of Beall or Chalasani, but instead simply state that the specification does not specify what the term "substantial" means. However Applicants have pointed out that the specification does indicates how the first organic is substantially removed, for example, by heating the green ceramic structural body to a first temperature at or above the first weight loss onset temperature, *but below the second weight loss onset temperature* for a time to enable *substantial removal.* Fig. 2 illustrates that the exothermic peaks are spaced apart. Moreover, CAFC precedent makes it clear that the use of the term "substantially" is not improper (see discussion on page 6, para. 2 of the

2/16/05 office action response).

Accordingly, it is asserted that the obviousness rejections of claim 1 should be overturned.

As the rejection relates to claim 16-20, and 22-23, the claimed invention is clearly not taught or suggested by any combination of the references. In particular, none teaches *following drying*, firing the green ceramic structural body in an atmosphere containing up to 21% by volume O_2 to a temperature and for a time to *substantially remove* the oil or oil-based compound *prior to* release of the binder. No such special firing considerations are taught or suggested by the combination of the cited references. Accordingly, the rejection of claims 16-20, and 22-23 is improper and should be withdrawn.

As the rejection relates to claim 24, the claimed invention is clearly not taught or suggested by any combination of the references relied upon. None teach following drying and during firing, heating the green ceramic structural body to a first temperature at or above the first weight loss onset temperature, *but below the second weight loss onset temperature* for a time to enable *substantial removal* of the oil or an oil-based organic compound, and then followed by further heating at a temperature at or above the second weight loss onset temperature until there is *substantial removal* of the organic binder compound. No such special firing considerations are discussed at all in any of the references. Examiner cannot point to any portion of Beall (US 6,132,671), Chalsani et al. (US 6,080,345) or Gheorgiu (US 6,287,671) to teach the desirability of heating the green ceramic structural body to a first temperature at or above the first weight loss onset temperature, *but below the second weight loss onset temperature* for a time to enable *substantial removal* of the oil, followed by followed by further heating at a temperature at or above the second weight loss onset temperature until there is *substantial removal* of the organic binder. Accordingly, the rejection of claims 24-27 is improper and should be withdrawn.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a *prima facie* case of obviousness, and that the Board should reverse the §103(a) rejection and find that claims 1 – 2, 4 – 6, 8-11, 15-20 and 22 – 27 are allowable over the prior art of record.

Conclusion

In conclusion, Appellants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of pending claims 1 – 2, 4 – 6, 8-11, 15-

20 and 22 – 27.

Please charge the fees due under 37 C.F.R. § 1.17(c) to Deposit Account No. 03-3325. It is believed that a **one (1) month extension of time** us required to make this Brief On Appeal be timely filed. Therefore, Applicant's attorney requests that any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. The fee required for the one (1) month extension of time under 37 C.F.R. § 1.136 is hereby requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

Dated: February 1, 2006

By: _____

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_____
Randall S. Wayland

VIII. CLAIMS APPENDIX

The claims on appeal are as follows:

Listing of the Claims:

1. **(Rejected)** A method for fabricating a fired ceramic article, the method comprising:
   (a) forming a batch mixture of components comprising inorganic ceramic powder materials and organic compounds, the organic compounds having weight loss onset temperatures of varying values, wherein in a plurality of organic compounds, a first organic compound has a first weight loss onset temperature of lower value, and a second and subsequent organic compound has a higher weight loss onset temperature, the batch mixture being capable of yielding a fired ceramic article;
   (b) intimately blending the components to form a workable and plasticized mixture;
   (c) shaping the plasticized mixture into a green ceramic structural body and thereafter drying;
   (d) following drying, heating the green ceramic structural body in a first phase, the heating being done in an oxidizing atmosphere to a temperature and for a time to enable sequential removal of the organic compounds, such that the organic compound with the first weight loss onset temperature being of lowest value is substantially removed prior to the organic compound with the subsequent higher weight loss onset temperature; and
   (e) further heating the green ceramic structural body in a second phase to a temperature and for a time to achieve the conversion of the green ceramic structural body into a fired ceramic article.

2. **(Rejected)** The method of claim 1 wherein the inorganic ceramic powder materials include cordierite-forming materials in an amount which is capable of yielding a fired ceramic article whose predominant crystal phase is cordierite.

3. **(Canceled)**

4. **(Rejected)** The method of claim 1 wherein the organic compounds include an oil or oil-based compound, a binder and optionally a surfactant.

5. **(Rejected)** The method of claim 4 wherein the oil or oil-based compound has a flash point in addition to having the weight loss onset temperature, the flash point being of higher value than the weight loss onset temperature.

6. **(Rejected)** The method of claim 5 wherein the temperature during heating in the first phase is maintained below the flash point of the oil or oil-based compound until said is substantially removed from the green structural body.

7. **(Canceled)**

8. **(Rejected)** The method of claim 4 wherein the oil or oil-based compound is a polyalpholefin.

9. **(Rejected)** The method of claim 4 wherein the oil or oil-based compound is substantially removed prior to the binder.

10. **(Rejected)** The method of claim 4 wherein the binder is a cellulose ether.

11. **(Rejected)** The method of claim 10 wherein the cellulose ether binder is methylcellulose, and/or methylcellulose derivatives.

12. **(Canceled)**

13. **(Canceled)**

14. **(Canceled)**

15. **(Rejected)** The method of claim 1 wherein the green ceramic structural body is heated in the first phase in an oxygen-rich atmosphere having up to 21% by volume O_2.

16. **(Rejected)** A method of firing a green ceramic structural body including an oil or oil-based compound, a binder and optionally other organic components, the method comprising:

drying the green ceramic structural body,

following drying, firing the green ceramic structural body in an atmosphere containing up to 21% by volume O_2 to a temperature and for a time to substantially remove the oil or oil-based compound prior to release of the binder and other optional organic components;

and,

further firing the green ceramic structural body to a temperature and for a time to achieve the conversion of the green ceramic structural body into a fired ceramic article.

17. **(Rejected)** The method of claim 16 wherein the oil or oil-based compound is a polyalpholefin.

18. **(Rejected)** The method of claim 17 wherein the binder is a cellulose ether.

19. **(Rejected)** The method of claim 18 wherein the cellulose ether binder is methylcellulose, and/or methylcellulose derivatives.

20. **(Rejected)** The method of claim 16 wherein the further firing of the green ceramic structural body is to a temperature of 1300°C to 1450°C with a hold time of 1 hour to 20 hours.

21. **(Canceled)**

22. **(Rejected)** The method of claim 1 wherein the green ceramic structural body is heated in the first phase at or above the first weight loss onset temperature, but below the weight loss onset temperature of the second and subsequent organic compound.

23. **(Rejected)** The method of claim 1 wherein the green ceramic structural body is heated in the first phase to a temperature at or above the first weight loss onset temperature and maintained below the flash point of the second and subsequent organic compound until said first organic compound is substantially removed from the green structural body.

24. **(Rejected)** A method for fabricating a fired ceramic article, the method comprising the steps of:

forming a batch mixture of components comprising inorganic ceramic powder materials, an oil or an oil-based organic compound having a first weight loss onset temperature, and an organic binder compound having a second weight loss onset temperature higher than the first weight loss onset temperature;

blending the components to form a plasticized mixture;

shaping the plasticized mixture into a green ceramic structural body;

drying the green ceramic structural body;

following drying and during firing, heating the green ceramic structural body to a first temperature at or above the first weight loss onset temperature, but below the second weight loss onset temperature for a time to enable substantial removal of the oil or an oil-based organic compound, and then followed by further heating at a temperature at or above the second weight loss onset temperature until there is substantial removal of the organic binder compound; and

further heating the green ceramic structural body to a temperature and for a time to achieve the conversion of the green ceramic structural body into a fired ceramic article.

25. **(Rejected)** The method of claim 24 wherein the heating step is carried out in an oxygen controlled atmosphere containing up to 21% O_2 by volume.

26. **(Rejected)** The method of claim 24 wherein the first temperature is below the flash point of the oil or an oil-based organic compound.

27. **(Rejected)** The method of claim 24 wherein the step of further heating the green ceramic structural body further comprises firing at the temperature of between 600-1450°C for the time of between 1-20 hours.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

None